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PCT

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06F 3/00, 13/00, H04B 1/74, H04M 3/36, H04Q 3/66

A1

(11) International Publication Number: WO 96/21184

(43) International Publication Date: 11 July 1996 (11.07.96)

(21) International Application Number: PCT/US95/17064

(22) International Filing Date: 29 December 1995 (29.12.95)

(30) Priority Data:
08/366,223 29 December 1994 (29.12.94) US

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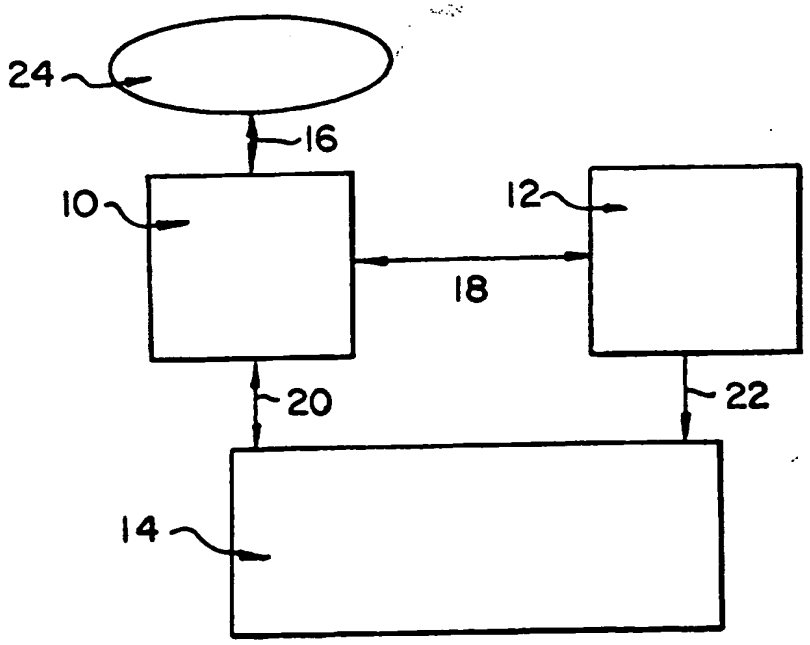
(81) Designated States: AU, JP, KR, MX, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: METHOD AND SYSTEM FOR TWO-WAY DATA TRANSMISSION WITH SECONDARY ONE-WAY CIRCUIT

(57) Abstract

A method and apparatus for augmenting the capacity of a bidirectional confirmed delivery transmission circuit (20) using a secondary unidirectional data delivery cirucit (22). A network point of presence (10) accesses a computer service (24) through a trunk connection (16). An endpoint (14) accesses the computer service (24) through the point of presence (10) using two-way communications on a primary circuit (20). Saturation of the primary circuit (20) is detected by the network point of presence (10) which alternataly routes selected communication data through a secondary network headend (12) on a data link (18) to be sent to the endpoint (14) on a secondary circuit (22).



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METHOD AND SYSTEM FOR TWO-WAY DATA TRANSMISSION WITH SECONDARY ONE-WAY CIRCUIT

FIELD OF THE INVENTION

The present invention relates generally to the field of data communications, and in particular to a technique for augmenting the capacity of a two-way confirmed delivery data transmission circuit.

BACKGROUND OF THE INVENTION

Computer based information systems have evolved to the stage where the general public has access to the wealth of information and software programs stored in private or public databases. In this regard, there have been developed large computerized databases which are accessible to a user over a telephone connection. Such databases include "Compuserve", Columbus, Ohio, "The Source", Arlington, Virginia, "Lexis", Mead Data Services, Dayton, Ohio, as well as the Internet which is not a computer system in and of itself but rather a combination of many computer networks and databases linked together to better serve the general public.

Typically, a user connects to a computerized database in the manner generally described as follows. First and somewhat separate from the physical connection process, the user establishes an authorized identification on one or more of the computer networks or databases by purchasing the identification from the network or database service supplier. The user then must install control software on his or her personal computer that enables the user to establish a physical connection to the computer network or database.

By executing the control software, the user is typically connected to the computer network or database through a dial-up modem connected to the ordinary

telephone lines using an established communications protocol such as TCP/IP (Transmission Control Protocol Internet Protocol), SLIP (Serial Line Interface Protocol) and PPP (Point-to-Point Protocol). The connection itself, a dial up modem connection over the ordinary phone lines, is suitable for a data services connection where the user's transactions are in a character interactive mode. This character interactive mode includes actions such as browsing files, reading bulletin boards, sending and receiving mail. The transmission delay time between the depression of a key on the keyboard and its' echo appearance on the display screen is so small that it is barely noticed by the user.

The growing popularity of computerized database services such as those previously mentioned has lead to the availability of shopping on the computerized databases where the user may purchase electronic goods that run on a personal computer over a computer network. Such goods include information in the form of files, video games and various software packages.

As the computing capacity of personal computers has grown, so has the size of the electronic programs which may be executed on them. For example, the nature of the information being used has evolved from basic text to color graphics, digitized photography, animation and digitized sound. This change to multimedia presentation of information is supported by the availability of multimedia PCs, supporting CD ROMS, MIDI sound cards, true color graphics and the like.

The use of multimedia, however, is memory intensive, resulting on file sizes typically in the tens of megabytes for a typical multimedia presentation. Memory, both RAM and disk memory, have

increased in capacity within PC's or workstations to accommodate multimedia. As users upgrade their workstations with multimedia capabilities, they have become more eager to communicate and retrieve information in multimedia form.

In support of the increase in computing power of personal computers or workstations, the nature of information available on the internet and other on-line services is changing from basic text to color graphics, digitized photography, animation and digitized sound.

On-line computer services such as Compuserve, Prodigy and the Internet, are becoming the shopping source for information such as multimedia files. As one resource for the distribution of large files, the networks connecting the online services to the end users need to have the capability of handling large files.

One of the problems encountered in accessing large files from online services is the inability to retrieve large files rapidly and cost effectively. It is well known that the transmission of a large file over the limited bandwidth channel of a traditional telephone line is limited because of the restrictions in the local loop. The conventional "loop" or connection from a local subscriber to the central office is by means of a twisted pair wire. Downloading large files by conventional dial up modems over traditional telephone lines typically transfer data at rates of 9.6 to 14.4 Kbaud. At 14.4 Kbaud, downloading a 20 megabyte file will take approximately 4 hours. During this time, the user's access charges for the database connection are often continuing, and his or her ability to proceed with use of the file is inhibited until the entire file has been received. It is readily seen that in this

scenario, the capacity of the endpoints of the network have outgrown the communications link between them.

There have been many attempts to overcome the limitations of the prior art and achieve rapid, cost effective and reliable access for users to information located in databases or to computer software packages located on various computer systems.

For example, U.S. Patent 4,534,024 of Maxemchuk et al. discloses a multiple access digital data communications system and method for transmitting digitized voice signals and data signals over a relatively wideband transmission medium, such as the CATV network. The system of the invention includes a communications path, a source station and a destination station. The source and destination stations are each adapted to be coupled to a source station home network and a destination station home network. The source station sends a signaling packet on a first transmit control channel. The signaling packet is for signaling a destination station that the source station has an information packet intended for the destination station. The destination station is adapted to detect the signaling packet on a second receive control channel. In response to the signaling packet, the destination station is coupled to the source home network. Thereafter, information packets may be transmitted from the source station on a third control channel and then be translated to a source station home network channel for transmission to the destination station.

U.S. Patent 4,677,686 of Hustig et al. discloses a system of two way data transmission over CATV systems. This invention permits two-way transmission to take place on the low band of a two-way capable system which

uses jumpers in place of reverse amplifiers. The system uses multiple receiver channels (eight per subscriber) to give each subscriber their own carrier frequency rather than a single time shared transmission channel so that malfunction of one remote terminal does not affect the system.

U.S. Patent 4,509,139 of Creager Sr. teaches a system for recording, storage and playback of binary information accessed by a terminal from a master database. The system of the invention records at a remote location, computer network data accessed from a phone connection simultaneous while data is displayed at a terminal at the remote location, and allows for the data to be played back off line at anytime from the computer network.

U.S. Patent 5,334,975 of Wachob et al. discloses a method for transmitting a time reference throughout a residence or a facility for use by appliances operating within the facility such as a home computer, VCR, and clocks. The time reference is received from the headend of a cable television (CATV) system at the subscriber converter and is retransmitted to set the internal clock timers of residential appliances throughout the house. The time reference is received by the CATV converter, encoded and modulated for transmission on residential AC wiring system which carries the AC power to such devices. The appliance receives the encoded time reference from the AC power line, demodulate the received signal and sets its internal clock timer.

Although the prior art has made advances in the area of data communications using various transmission techniques such as those previously described, the transfer of a large file or data stream is still very slow, and interferes with the end user's ability to

interact with the computer network. Other attempts in the prior art to provide faster two-way data communications have often introduced other technical problems as well as greater costs to the user.

A desired data transmission system should provide a way to facilitate the transfer of a large file from a database on the computer network to a file on the user's computer. The system should provide rapid, accurate data transmission, and as importantly, without greatly increasing the cost to the end user. The system should include a way of providing an end user with the additional capacity needed only for the period of time that the user requires it, without adding complexity to the user of the system, and with minimal impact on the communications network.

SUMMARY OF THE INVENTION

The present invention provides a method and apparatus for using a one-way circuit to augment the capacity of a two-way confirmed delivery data transmission circuit.

More particularly, the present invention provides a method and apparatus of providing increased unidirectional data transmission throughput using a conventional two-way data circuit such a telephony, wired or cellular network coupled with a conventional one way broadcast medium such a Cable TV, Microwave or Satellite.

A one-way circuit is not by itself useful for the implementation of a two-way data transmission link, however, a one-way circuit can be used to enhance the capacity of an existing two-way data transmission link, which enhancement is in the direction of the one-way

circuit. For example, a 9600 bit per second two-way data link using a data modem can be enhanced by proper coupling with a 500 kilobit per second one-way data link serving the same two endpoints, using the method of the present invention to couple the two separate physical paths at either end of the link.

Accordingly, the method of this invention might include for the purposes of transmitting data, coupling telephone lines with microwave links, satellites, cable television and any other media over which it is desirable and cost effective to send high speed data. In the summary which follows, an application of this invention to the transmission of computer information over a two-way telephone line coupled with the one-way cable television broadcast medium will be discussed.

In one embodiment, the system of this invention works generally as follows: A user decides they would like to query database files or shop for electronic information over an on-line computer service. The user turns on their computer, which in turn executes some software package that will allow the user to access a computer network. The user selects the option which will allow their computer to connect to the computer network. Once connected over the two-way network, the user may interact with the computer service in a character interactive mode, basically browsing through information, reading menus or directories, or the user may make a request of the network. If the user has decided to obtain a file or data stream from the computer network, the computer software executing on the user's PC makes the request over the two-way network using a specific, agreed to data communications protocol.

Once the request has been received at the on-line computer service, the on-line computer service begins to send the file or data stream back to the user over the conventional two-way network.

At some point when the data is being sent to the user who has requested it, the two-way network may become saturated. For example, the file may be too large or the data is being made available for transmission too rapidly relative to the two-way networks speed. Previously, in the prior art, the end user would wait until the situation is relieved. However, in accordance with the present invention, once saturation occurs or is about to occur, a "switch" or router in the two-way network automatically detects the condition, and opens up one or more secondary one-way network routes to the end user. The secondary one-way route may be a completely separate path to the end user, a completely separate transmission medium that is configured to reach the same endpoint as the two-way network. The router simultaneously directs exclusive portions of the data over both channels, the two-way network and the one-way network. Since both networks service the same endpoint, there is a physical connection to the user's workstation or communications device for each network. Control software executing in the workstation or communications device effectively rebuilds the file or data stream requested by the user from the data it has received over multiple ports, while continuing to send acknowledgements to the on-line computer service that the file is being received.

Once the complete file or data stream has been received by the end user, the router or switch in the two-way network automatically stops communications to the end user over the secondary one-way network. The process of starting and stopping communications with

the user over the secondary one-way network is transparent to the user. The user may then continue to interact with the on-line computer service or choose to disconnect from the service.

By the practice of the present invention, the total time elapsed for the entire procedure of obtaining a large file or data stream is reduced from several hours down to several minutes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of the system of the invention.

FIG. 2 is a detailed block diagram showing the components of the system of the invention.

FIG. 3 is a block diagram showing an alternative connection to the endpoint of the invention.

FIG. 4 is a flow chart of the control software executing in the router of the system of this invention.

FIG. 5 is a flow chart of the control software executing at the endpoint of the system of this invention.

FIG. 6 is a state diagram of the system of the present invention.

DESCRIPTION OF THE INVENTION

The system of this invention, as best seen with reference to FIG. 1, includes the following major components: a network point of presence 10, an on-line computer service 24, a trunk physical connection between the network point of presence and the on-line computer service 16, a secondary network headend 12, a data link 18 connecting the network point of presence 10 and the secondary network headend 12, an endpoint

14, a primary two-way circuit 20 connecting the network point of presence 10 and the endpoint 14, and a secondary one-way circuit 22 connecting the secondary network headend 12 and the endpoint 14. It is readily understood that there may be one or more secondary network connections, however, for the purposes of this description, only one will be considered.

The on-line computer service 24 may be any sort of online service such as Compuserve, Prodigy, American Online, Lexis, Dialog and the Internet which is not a computer system in and of itself but rather a group of computer systems networked together.

The trunk physical connection 16 between the on-line computer service 24 and the network point of presence 10 is a physical connection of circuitry adequate for the transmission of data between the computer databases and network routing equipment. Examples include such connections as T-1 or T-3 lines, and fiber optic channels. The trunk physical connection 16 must have adequate capacity to serve all attached users.

The network point of presence 10 includes several subcomponents which will be discussed in a subsequent section. The network point of presence 10 functions to control and regulate access by subscribers dialing in from the primary one-way circuit to the on-line computer services. It verifies the subscriber's authority to access a computer service and establishes the appropriate logical and physical connections between the endpoint and the on-line computer service.

Data link 18 provides the connection between the network point of presence 10 and the secondary network headend 12. In a preferred embodiment, data link 18

should have the capacity to transmit at a speed that may be substantially higher than the primary two-way circuit 20. Examples of circuitry adequate for this connection include dedicated fiber strand, a T1 circuit or microwave link, which have the capacity to transmit at 500 kilo bits per second.

Two-way circuit 20 is a signal path customarily used to send information both ways. Examples of such include and are not limited to a wired telephony circuit, a two-way radio system, a two-way cable TV system.

One-way circuit 22 is a signal path customarily used to send information in only one direction. Examples of such include territorial broadcast such as AM radio, FM radio, television, paging, a one-way cable TV system, and satellite broadcast, both geosynchronous and low earth.

Endpoint 14 is generally located at the premises of the subscriber to the computer service database. Endpoint 14 must be capable of physically connecting to both the two-way circuit and the one-way circuit. Typically, endpoint 14 will be a personal computer, workstation or telecommunications device located in the premises of the user of the present invention, equipped with two or more data network interfaces, or equipped with a data communications device connected to two or more network interfaces.

Endpoint 14 employs control software which is capable of establishing a connection from the end user to the on-line computer service using an agreed upon protocol.

The operation of the system of this invention is best described with reference to FIG. 2. Initially, prior to the practice of the present invention, a physical connection is established between the network point of presence 10 and the secondary network headend 12. The physical connection, referred to as a data link 18 may be a high capacity channel which carries a one way data stream from a router 40 in the network point of presence 10 to a modulator 70 or transmitter located in the secondary network headend 12. In a preferred embodiment, the capacity of data link 18 is sufficient to fill at least one subscriber one-way circuit 22 to capacity. The data link 18 may be a dedicated fiber strand which is preferred for establishing a connection within a system service area, while a leased telephony circuit or microwave is preferred for establishing a connection outside the system service area. By system service area, it is generally meant that area where it is cost effective to construct or use dedicated fiber strands to the network point of presence 10.

The network point of presence 10 is connected to an on-line computer service 24 by line 16 which in a preferred embodiment is a T1 or T3 line. A T1 or T3 line provides a high speed, high capacity two-way data channel suitable for transmitting data to and from a computer network. The speed of this circuit 16 should be sufficient to fill to capacity both the two-way subscriber circuit 20 and the one-way subscriber circuit 22 at the same time for at least one subscriber.

The trunk physical connection 16 connects the on-line computer service to a DSU/CSU 48 which is located within the network point of presence.

DSU-CSU 48 is connected to a router 40 located in the network point of presence 10 facility through data cable 42. The router 40 functions to direct data between from the on-line computer service 24, dial in modems 32 from end subscribers and the secondary network headend 12. Router 40 is connected to a local area network 94 located in the network point of presence 10 by wire 38. Router 40 executes control and interface software which allows for the establishment of logical connections between all addressable locations.

Connected to the local area network 94 in the network point of presence 10 is a data transmission interface 98 which provides the I/O interface to the data link 18 which connects the network point of presence 10 to the secondary network headend 12. The data transmission interface 98 may be any machine suitable to serve as coupling device.

Also located within the network point of presence 10 is a network terminal server 96 which is cabled by cable 34 to a bank of modems, indicated generally by reference character 32. The terminal server 96 is configured to contain the logical address of each subscriber capable of dialing into the bank of modems 32 contained in the network point of presence 10.

The bank of modems 32 are connected directly to the two-way circuit indicated by reference character 20. Two-way circuit 20 will typically be a wired telephony circuit but it is readily understood that any two-way circuit suitable for transmission of data will be adequate. Examples of other two-way suitable circuits include a two way radio system and a two way cable network, as well as the conventional telephony network.

The two-way circuit 20 terminates at endpoint 14. Typically, endpoint 14 will be a subscribers residence or business, however it is readily understood that endpoint 14 is any location suitable for connection to a two-way data transmission circuit and a one-way data transmission circuit.

Two-way circuit 20 terminates at network endpoint 14 at telecommunications device 30. In a preferred embodiment, telecommunications device 30 will be some form of modem, and may be any brand modem commercially available that supports dial up or fixed circuit connectivity. In a preferred embodiment, telecommunications device 30 is a capable of transmitting and receiving data at a rate of 9600 to 14400 bps. This is a transmission rate adequate for interacting in character mode from endpoint 14 to computer network 24. This allows a minimum delay time between pressing a key on the keyboard and the display of that character's echo on the screen. Telecommunication device 30 in the network endpoint 14 is connected to a computer or workstation 26 by a serial cable connection 28. Serial cable connection 28 is a standard RS-232C cable connected to the serial port of the modem 30 and the serial port of user's personal computer. Personal computer or workstation 26 is any device configured with at minimum a serial port and a high speed one-way data input port, such as an appropriately configured parallel or network port, and is capable of executing appropriate data communications protocol software, such as TCP/IP.

The one-way data input port of the workstation 26 located at the network endpoint 14 is connected by a high speed parallel or network cable 50 to a receiver 52. In a preferred embodiment, the receiver 52 is a cable television data receiver capable of being tuned

to a 500 kbps data carrier frequency which in turn is suitable for high speed transmission of data.

Software in the personal computer or workstation 26 is adapted to receive data from both network interface ports in a process which will be subsequently described. In an alternative embodiment, connection by the user to the one-way 20 and two-way network 22 may be established by a two port data interface device 44 which is connected to the personal computer or workstation 26 by high speed two-way cable 46. This alternative connection, suitable for use with computer or workstation 26 which is not configured with more then one port, may be viewed with reference to FIG 3.

Software in the personal computer or workstation 26 or alternatively the two-port data interface device 44 is capable of reassembling the data it has received from the multiple ports and send acknowledgement back to the on-line computer service 24 over the two-way circuit 20.

Resuming the discussion with reference to FIG. 2, receiver 52 is connected to the one-way circuit indicated generally by reference character 22. For the purpose of this discussion, one-way circuit 22 will be that provided by a one-way cable television network although it is readily understood that any one-way circuit suitable for data transmission would be an acceptable application of the invention.

It can be seen from FIG. 2, that receiver 52 is attached by wire 54 to a signal splitter indicated by reference character 56. Splitter 56 separates the carrier data signal from the broadband video signal it receives over one-way circuit 22. Broadband video signals received over the one-way circuit 22 are sent

by the splitter 56 over wire 58 and into a cable system converter 60, and then sent over cable wire 61 and viewed from display unit 62. The converter 60 may or may not be required under certain circumstances, and this variation is not germane to the function of the data system being discussed.

The baseband data signal received at splitter 56 is separated from the video signal and sent over wire 54 for processing in accordance with the method of this invention.

One-way circuit 22 is the physical link which connects the network endpoint 14 to the secondary network headend 12. In a preferred embodiment, the capacity of one-way circuit is 500 kbps which provides the ability to transmit a 5 Mb file in approximately 90 seconds, based on distinct portions of the data being sent through the two-way circuit 20 and the one-way circuit 22 separately during the 90 seconds.

In a preferred embodiment, secondary network 12 consists of the following components as best seen with reference to FIG. 2: a modem bank 90; a data services control computer 86; a control distributor 82; encoders 78; secondary network I/O 72; data modulator 70 and combiner 64.

For the practice of this invention, data is received into the secondary network headend off data link 18 by secondary network interface device 72. Secondary network interface device 72 is any machine capable of functioning as an interface to circuit 18. The secondary network headend interface device 72 receives the data transmitted to the secondary network headend 12 by the network point of presence 10 and sends it along wires indicated generally by reference

character 100 into a data buffer/encoder 78. The data buffer/encoder 78 prepares the data into packets suitable for transmission over the one-way circuit 22. The data packets are then sent along wire 76 into a data modulator 70. The modulated data is send over wire 68 into a combiner 64 which combines the one-way path data signal with the broadcast signals such as cable television signals from the television headend. Wire 66 indicates the input flow of data typically sent over the one-way circuit. The combined data is then sent out over the one-way circuit to endpoint 14.

FIG. 4 maps the process flow of the control software of the system in the router at network point of presence 10. A new session is established at step 200, and a subscriber located at an endpoint is connected to an on-line computer service by the network point of presence 10 at step 202.

At step 204 the subscriber can terminate the process. So long as the subscriber is not finished at step 204 with their network session, the system proceeds to step 206 where the subscriber selects a service from the on-line computer service. If the user has not requested a file or data stream from the on-line computer service at step 208, the system loops back to junction point 210 and rechecks if the subscriber is ready to terminate his or her session at step 204. If, at step 208, a subscriber has requested a file or data stream from the on-line computer service, a data transfer is started at step 212 where data is transmitted from the network over the two-way circuit to the subscriber located at a network endpoint.

At step 214, the system checks if the data transmission has completed. If the data transmission has completed at step 214, the system loops back to

junction point 210, then rechecks if the subscriber is ready to terminate his or her session at step 204. If, at step 214, the data transmission has not completed, the system proceeds to step 216 and checks to see if the two-way circuit has become saturated by the data transmission. If the two-way circuit is not saturated, the system loops back to junction point 220, and rechecks if the transmission is complete at step 214.

If the two-way data circuit has become saturated by the data transmission at step 216, the system proceeds to step 218 and augments the transmission by sending additional data to the subscriber over the secondary one-way circuit. The system loops back to junction point 220, and continues to check at step 214 if the transmission has completed.

If transmission of the file or data stream is completed at step 214, the secondary network connection, if any, is automatically terminated at step 215.

Resuming the discussion at step 210 where the system checks if the subscriber is finished with the network session, if the subscriber is finished with the session, the system progresses to step 220 where the network connection is terminated. The process is then completed at step 222.

The system software provides means for rebuilding the data which has been transmitted from the network to the subscriber over the multiple circuit network which is depicted in FIG. 5. The process is started when subscriber's computer dials into a computer network at step 232. Once the connection is established, the system proceeds to step 234 where it checks to see if the subscriber is ready to terminate the session. If

the subscriber is not ready to terminate the session, the system proceeds to step 236 where it checks to see if the subscriber is requesting a file or data stream. If the subscriber has not requested a file or data stream, the system loops back to junction point 240, and then checks if the subscriber is finished at step 234.

If, at step 236, the user has requested a file or data stream, the system proceeds to step 238 where it begins to receive the data transmission. At step 240 the system begins a loop to check if the file or data stream transmission has completed. If the file or data stream transmission has completed at step 240, the system loops back to junction point 240 and checks to see if the subscriber is ready to terminate his or her session at step 234.

If the transmission has not completed at step 240, the system proceeds to step 242 where it checks to see if it is receiving data on multiple ports. If the system is receiving data on multiple ports, it rebuilds the file or data stream at step 244. The system then proceeds back to junction point 246 where it then proceeds to check if the file or data stream transmission is complete at step 240.

If, at step 242, data is not incoming on multiple ports, the system loops back to junction point 246 and then checks to see if the transmission is completed at step 240.

Resuming the discussion at step 234, if the subscriber is finished with their network session, the system proceeds to step 246 where the network connection is terminated and the process is completed at step 248.

In use, the method and apparatus of this invention works generally as follows, which may be viewed with reference to the state diagram in FIG. 6. A subscriber located at an endpoint of the multiple circuit network decides he or she is going to log into an on-line computer service. The subscriber powers on his or her computer and executes the software that will connect to a on-line computer service through a contemporary two-way network such as the ordinary telephone line. The subscriber may interact with the network in a character interactive mode such as sending and receiving mail.

During the subscriber's session with the computer network, the subscriber makes a decision to obtain a file or data stream by requesting the file or data stream be sent from the on-line service. At this point a file or data stream transfer session is established between the subscriber and the on-line service over the primary two-way circuit through which the user is connected.

Once the file or data stream transfer session is established, the on-line service begins sending data in the format of packets over the two-way circuit to the endpoint, while software in the endpoint sends confirmation back to the on-line service each time a packet of data is received.

If a file or data stream requested, it is likely that the two-way circuit will be saturated by the amount of data that is passing between the endpoint and the on-line computer service. If saturation occurs, a router located at the network point of presence detects the situation and activates the secondary one-way circuit to the subscriber's premises. Software in the router automatically begins to send select data to the subscriber's premises over the one-way network. A

receiver located in the subscriber's premises receives the data from the one-way circuit and steers it over a cable to a high speed input port in a personal computer or two-path interface device. Software running in the personal computer or two-path interface device detects that data is being received from multiple ports and automatically begins to reassemble the data transmitted back to its original format. Software running in the workstation also sends acknowledgement over the two-way circuit for data received on both the one-way circuit and the two-way circuit.

Allocation of data by router is performed in a way that preserves keystroke echo responsiveness by steering interactive data packets over the two-way circuit. Further, the router works to keep the individual two-way circuits saturated because each subscriber has a separate, dedicated two-way circuit and capacity of these circuits is not shared. Once transmission of the file or data stream is complete, the router automatically disconnects the secondary one-way circuit to the endpoint.

What is claimed is:

1. A communications system for transmitting and receiving information, said system comprising, in combination:

a. a primary data transmission circuit;

b. a secondary data transmission circuit;

c. a router device for controlling the flow of data over said primary data transmission circuit and said secondary data transmission circuit;

d. a data link for connecting the primary data transmission circuit to the secondary data transmission circuit;

e. a network endpoint;

f. a remote computer services network.

2. The communications system defined in claim 1, wherein said primary data transmission circuit is two-way capable.

3. The communications system defined in claim 1, wherein said secondary data transmission circuit is one-way capable.

4. The communications system defined in claim 1, wherein said router device includes control software for establishing network connections between said network endpoint and said remote computer services network over said primary data transmission circuit.

5. The communications system defined in claim 4, wherein said control software automatically detects saturation of said primary data transmission circuit.

6. The communications system defined in claim 4, wherein said control software automatically activates a

connection to the said network endpoint over said secondary data transmission circuit.

7. The communications system defined in claim 4, wherein said control software automatically sends selective data over said primary data transmission circuit and secondary data transmission circuit simultaneously.

8. The communications system defined in claim 4, wherein said control software automatically detects data transmission from said remote computer services network and said network endpoint is completed.

9. The communications system defined in claim 4, wherein said control software automatically deactivates the connection over said secondary data transmission circuit.

10. The communications system defined in claim 1, further comprising a two port data interface device in communication with said primary data transmission circuit and said secondary data transmission circuit.

11. The communications system defined in claim 10, wherein said two port data interface device includes control software for the reconstruction of data received from said primary data transmission circuit and said secondary data transmission circuit.

12. The communications system defined in claim 10 wherein said control software sends acknowledgement over said primary data transmission circuit for data received over said primary data transmission circuit.

13. The communications system defined in claim 10 wherein said control software sends acknowledgement

over said primary data transmission circuit for data received over said secondary data transmission circuit.

14. A method for transmitting and receiving computer files or data streams comprising the steps of: establishing a primary data transmission circuit for simultaneously transmitting and receiving computer files or data streams to and from a network endpoint and a remote computer services network; establishing a secondary data transmission circuit for transmitting and receiving computer files or data streams to and from the primary data transmission circuit and the network endpoint; establishing a link between the primary data transmission circuit and the secondary data transmission circuit; the endpoint requesting computer files or data streams by way of an electronic signal over the primary data transmission circuit; sending computer files or data streams as an electronic signal over the primary data transmission circuit to the endpoint.

15. The method of claim 14 further comprising the steps of: automatically detecting overload or saturation of the primary transmission system; activating a connection between the primary data transmission circuit and the secondary data transmission circuit; sending computer files or data streams as an electronic signal over the primary data transmission circuit and the secondary data transmission circuit simultaneously; detecting that transmission of the data transmission from the remote computer services network to the network endpoint has completed; automatically deactivating the secondary data transmission circuit connection to the network endpoint.

16. The method of claim 15 further comprised of: combining computer information received from the primary data transmission system and the secondary data transmission system at the network endpoint; sending acknowledgement over the primary data transmission circuit from the network endpoint to the remote computer service network for data received over the primary data transmission circuit; sending acknowledgement over the primary data transmission circuit from the network endpoint to the remote computer service network for data received over the secondary data transmission circuit.

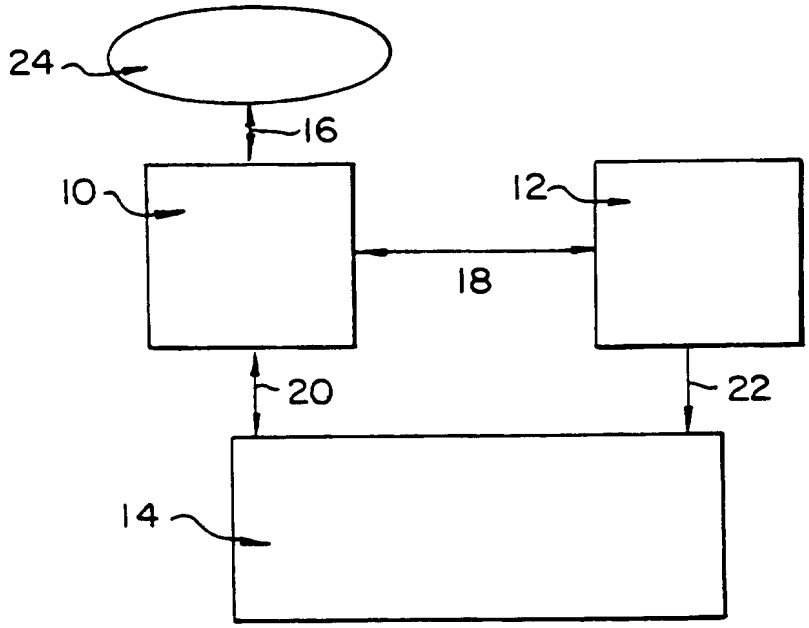

FIG. 1

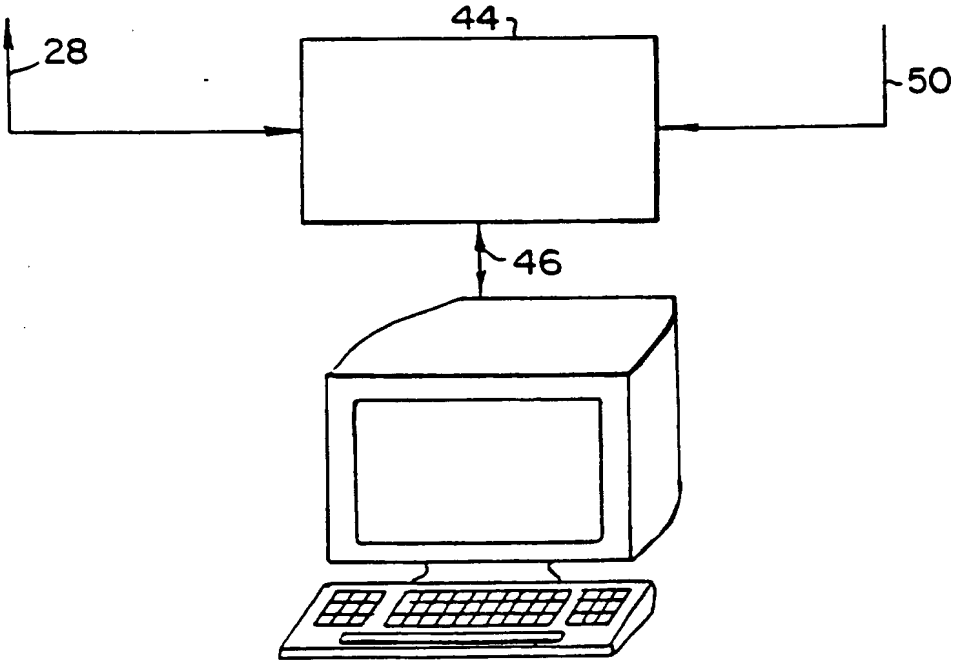

FIG. 3

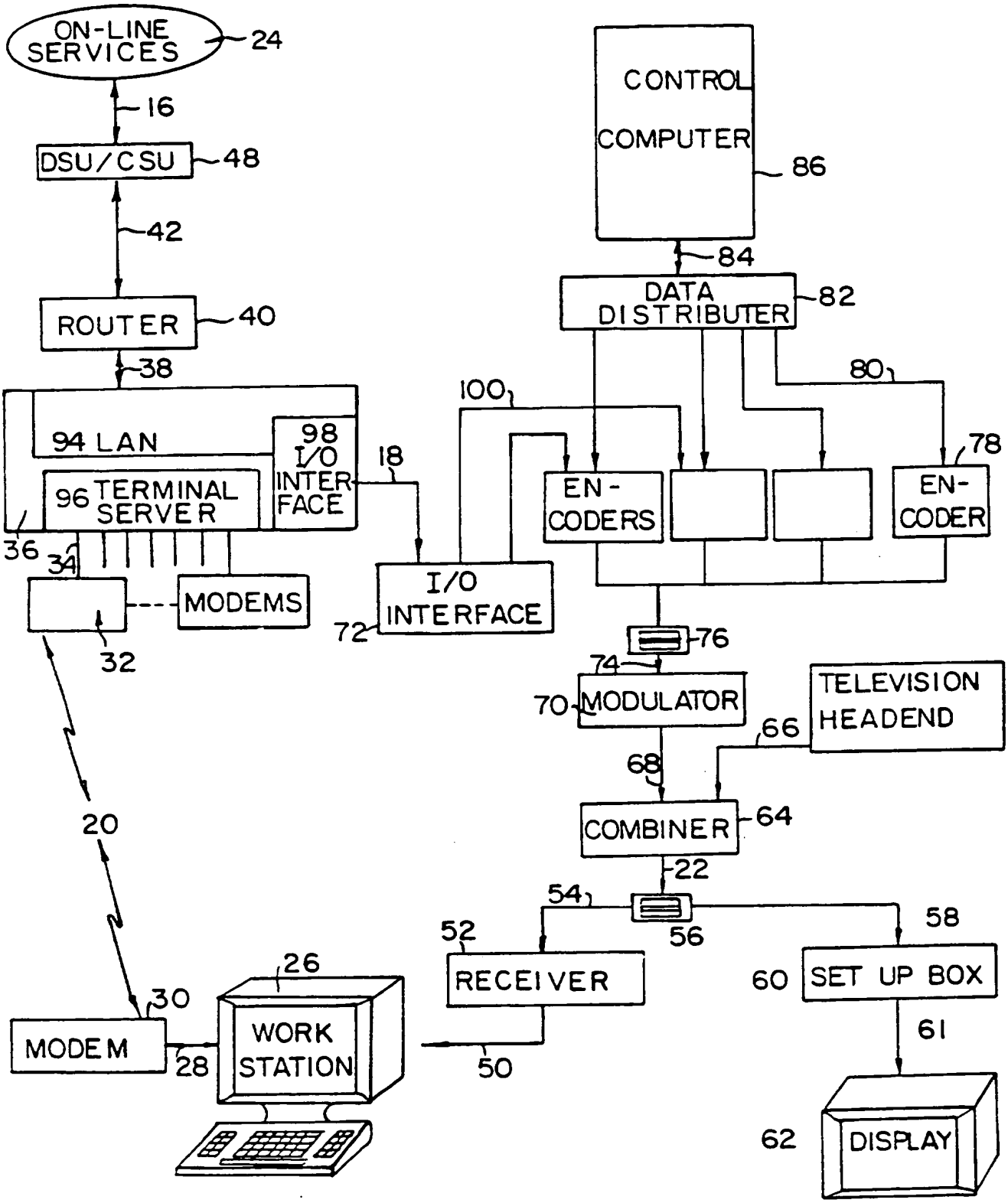
ON-LINE SERVICES
24
16
DSU/CSU
48
42
ROUTER
40
38
94 LAN
98 I/O INTERFACE
18
96 TERMINAL SERVER
36
34
MODEMS
32
20
MODEM
30
28
WORK STATION
26
CONTROL COMPUTER
86
84
DATA DISTRIBUTER
82
100
80
EN-CODERS
78
EN-CODER
I/O INTERFACE
72
76
74
70
MODULATOR
TELEVISION HEADEND
66
68
COMBINER
64
22
54
56
58
52
RECEIVER
50
60
SET UP BOX
61
62
DISPLAY

FIG. 2

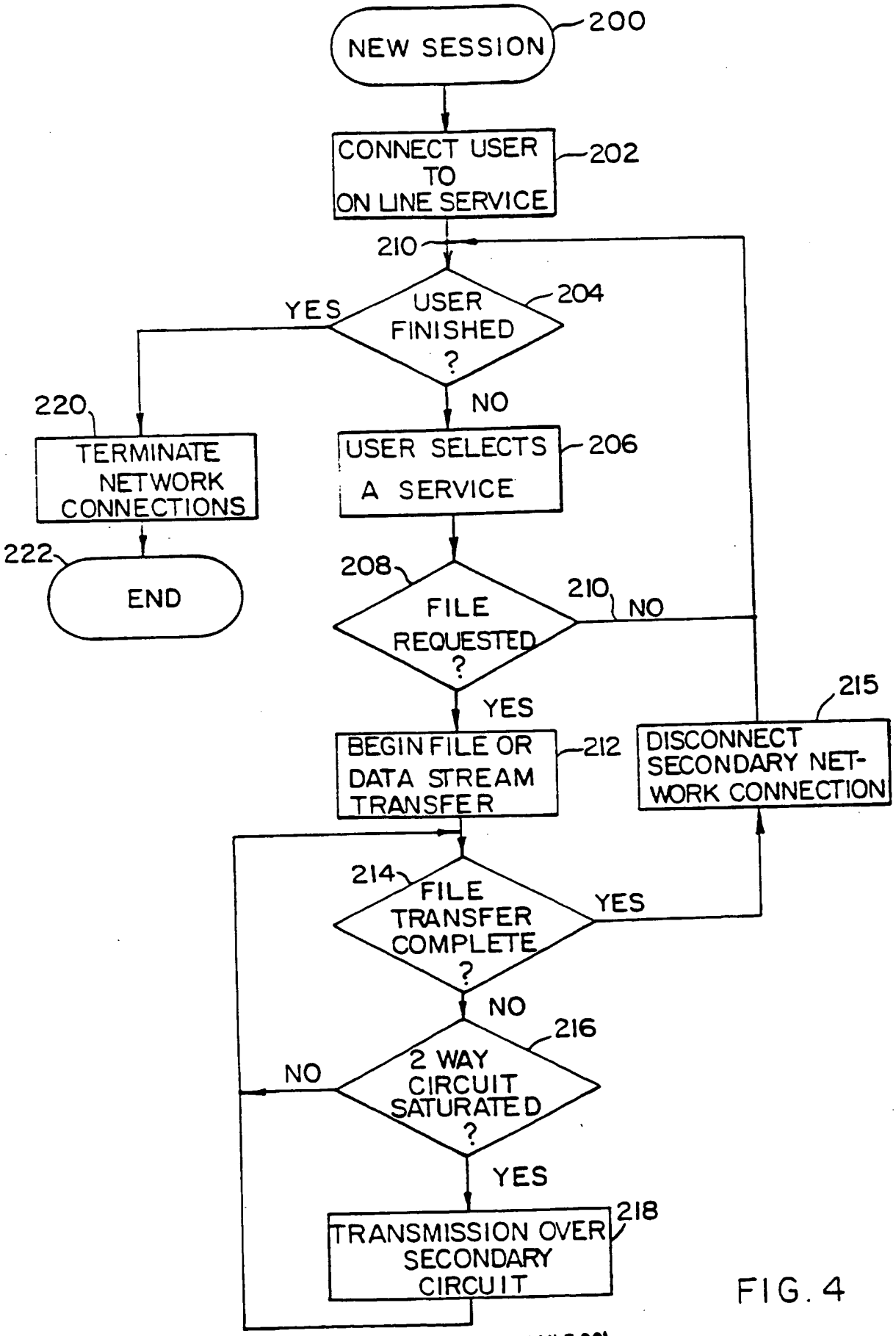
NEW SESSION
200
CONNECT USER TO ON LINE SERVICE
202
210
USER FINISHED ?
204
YES
NO
220
TERMINATE NETWORK CONNECTIONS
222
END
USER SELECTS A SERVICE
206
208
FILE REQUESTED ?
210
NO
YES
215
DISCONNECT SECONDARY NETWORK CONNECTION
BEGIN FILE OR DATA STREAM TRANSFER
212
214
FILE TRANSFER COMPLETE ?
YES
NO
216
2 WAY CIRCUIT SATURATED ?
NO
YES
TRANSMISSION OVER SECONDARY CIRCUIT
218

FIG. 4

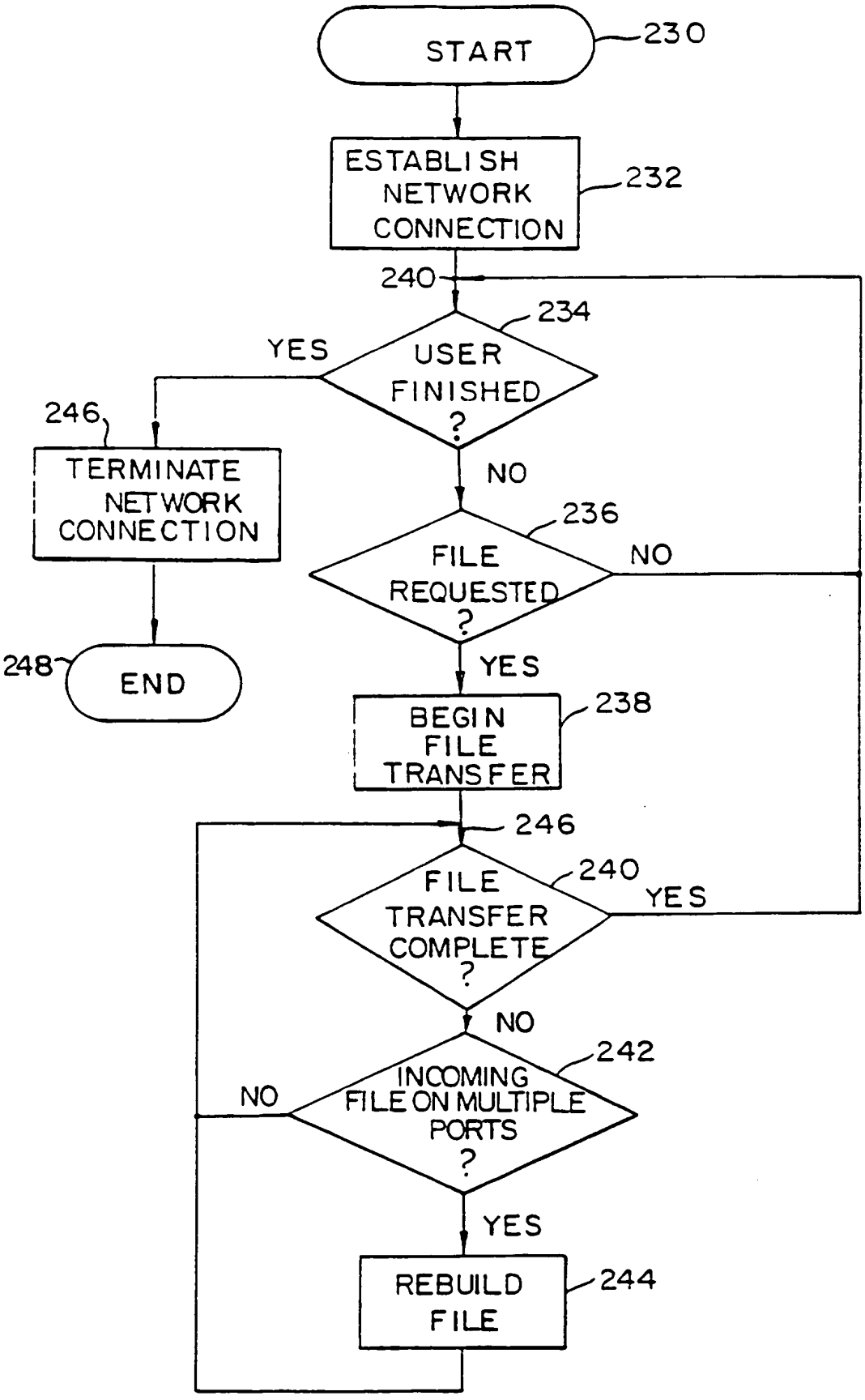
START
230
ESTABLISH NETWORK CONNECTION
232
240
234
USER FINISHED ?
YES
246
TERMINATE NETWORK CONNECTION
NO
236
FILE REQUESTED ?
NO
248
END
YES
BEGIN FILE TRANSFER
238
246
240
FILE TRANSFER COMPLETE ?
YES
NO
242
INCOMING FILE ON MULTIPLE PORTS ?
NO
YES
REBUILD FILE
244

FIG. 5

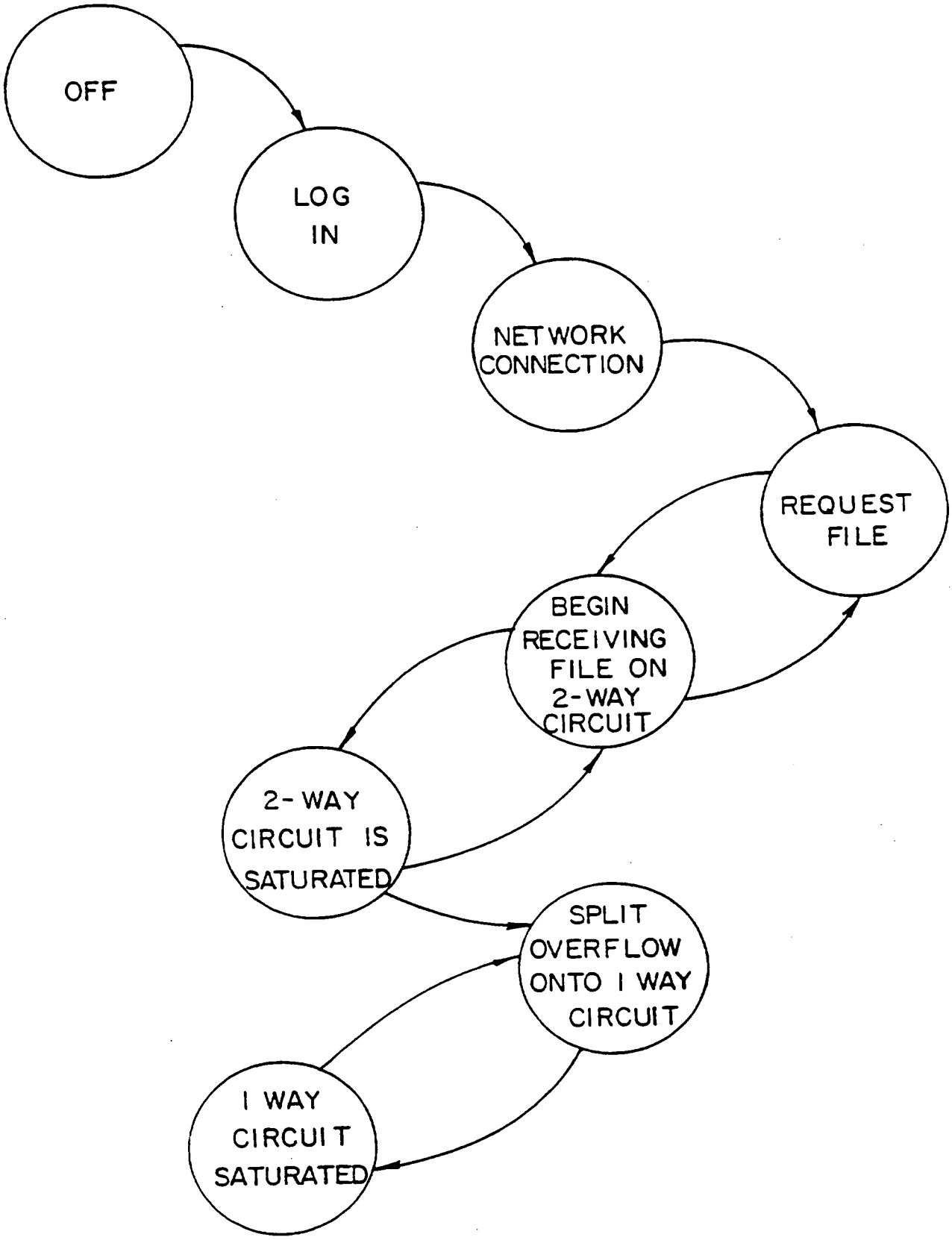
OFF
LOG IN
NETWORK CONNECTION
REQUEST FILE
BEGIN RECEIVING FILE ON 2-WAY CIRCUIT
2-WAY CIRCUIT IS SATURATED
SPLIT OVERFLOW ONTO 1 WAY CIRCUIT
1 WAY CIRCUIT SATURATED

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/17064

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 3/00, 13/00; H04B 1/74; H04M 3/36; H04Q 3/66
US CL :395/200.15, 200.09; 340/825.01; 348/12; 364/269.3; 370/16; 455/5.1, 8
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 395/200.15, 200.09; 340/825.01, 825.03, 827; 348/6-16; 364/268, 268.3, 268.7, 269.3; 370/16-16.1; 455/3.1-6.3, 8; 379/221, 273

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

USPTO APS | search terms: alternate, secondary, spare, susidiary, auxiliary, channel, path, connection, link, circuit, route, congestion, blocking, traffic, saturation, overflow, overload, concentration, sense, detect, measure, determine

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US, A, 5,442,389 (BLAHUT etal.) 15 AUGUST 1995 See Abstract; Fig. 1, 11; Col. 1-2; Col. 3, line 17 - Col. 4, line 21; Col. 15, lines 55-68	1-16
Y	US, A, 5,262,875 (MINCER et al.) 16 NOVEMBER 1993 See Abstract; Fig. 1; Col. 1, line 65 - Col. 2, line 8; Col. 2, line 43 - Col. 3, line 52; Col. 5, line 47 - Col. 6, line 8; Col. 7, line 16 - Col. 8, line 38	1-16

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
29 MARCH 1996

Date of mailing of the international search report
22 APR 1996

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Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/17064

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, P	US, A, 5,499,289 (BRUNO et al.) 12 MARCH 1996 See Abstract; Fig.1, 4; Col. 6, line 14-33	1-16
Y	US, A, 4,509,139 (CREAGER, SR.) 02 APRIL 1985 See Abstract; Fig. 4; Col. 1-3	1-3
Y	US, A, 4,845,658 (GIFFORD) 04 JULY 1989 See Abstract; Fig. 1, 3, 6, 8-9; Col. 2-4; Col. 7-8; Col. 11, line 61 - Col. 12, line 21; Col. 13, line 36 - Col. 14, line37	1-16
Y, P	US, A, 5,442,749 (NORTHCUTT et al.) 15 August 1995 See Abstract; Fig. 2-9; Col. 1-6	1-16
A	US, A, 4,205,326 (PORTER et al.) 27 MAY 1980 See Abstract; Fig, 1-2; Col. 1-2	1-16
Y	US, A, 5,253,248 (DRAVIDA et al.) 12 OCTOBER 1993, See Abstract; Fig. 16-27; Col. 1-4; Col. 11, lines 6-22	1-16